REMARKS

In the Outstanding Office Action, claims 1-36 currently of record in the application have been rejected by the Examiner based on 35 U.S.C. 112, first paragraph and 35 U.S.C. 112, second paragraph. No rejection of the claims based on prior art of record has been provided by the Examiner.

I. REJECTION UNDER 35 U.S.C. § 112, FIRST PARAGRAPH FOR FAILURE TO ENABLE

In paragraph 2 of the Office Action, the Examiner argues that the specification is enabling for trees or forests but does not reasonably provide enablement for all biomass materials that are photosynthetically produced. The Office Action further states that "there are a plethora of materials that are photosynthetically produced; however, Applicant refers to only trees or a forest." Applicant respectfully disagrees with the Examiner's opinion and submits that the present invention is enabling for all "photosynthetically produced" biomass.

The standard for enablement is recited in MPEP 2164.01, stating:

> The standard for determining whether the specification meets the enablement requirement was cast in the Supreme Court decision of *Mineral Separation v. Hyde*, 242 U.S. 261, 270 (1916) which postured the question: is the experimentation needed to practice the invention undue or unreasonable? That standard is still the one to be applied. *In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988). (Emphasis added)

Thus, an application is enabling even if experimentation is needed so long as the experimentation needed to practice the invention is not undue or unreasonable.

According to the above-presented opinion of the Examiner, the invention is enabling for trees and forests. Applicant respectfully disagrees with this position and considers that at least paragraphs [0005] and [0039] of the specification provides enablement for all plants. Paragraph [0005] states, "In fact, the carbon present in the biomass based energy sources derives from the atmosphere and has been integrated into the biomass as a consequence of assimilation during plant growth." Further, paragraph [0039] states, "The inventive method achieves this control over the atmospheric CO2 level (i) by using solar energy for assimilation of CO2 and forming a corresponding amount of biomass in plants."

MPEP 2164.01 states further:

> A patent need not teach, and preferably omits, what is well known in the art. *In re Buchner*, 929 F.2d 660, 661, 18 USPQ2d 1331, 1332 (Fed. Cir. 1991) . . . Any part of the specification can support an enabling disclosure, even a background section that discusses, or even disparages, the subject matter disclosed therein. *Callicrate v. Wadsworth Mfg., Inc.*, 427 F.3d 1361, 77 USPQ2d 1041 (Fed. Cir. 2005) (Emphasis added).

Thus, any part of a specification can enable one of ordinary skill in the art to practice the invention. It should be also noted however, it is preferable to omit that which is known in the art. The Disclosure of the application is enabling and definitely so, when combined with what is known in the prior art.

Biomass materials and those which are photosynthetically produced are well known in the art. Thus, it is the Applicant's position that (confirmed by the above sections of MPEP) a detailed disclosure in the application is not necessary and, in fact, should preferably be omitted from the present application. The present application is enabling for all biomass material which is photosynthetically produced based on the teachings of the prior art. There is no undue burden on a person having reasonably skill in the art to determine if a particular organism fits into the category of biomass produced by photosynthesis. The category is well circumscribed and includes plants, trees, cyanobacteria, etc, etc. (See, for example, Exhibit I, "Photosynthesis", http://en.wikipedia.org/wiki/Photosynthesis, accessed October 17, 2007).

Still further, many issued patents refer to biomass and the photosynthethis process without providing specific definitions of such terms. One such example is U.S. Patent 6,818,027 to Murcia, issued on November 16, 2004. (A copy of this Patent is attached as Exhibit II.) Each claim of the Murcia patent includes the term "biomass", but a precise definition is not to be found in the specification. This is apparently because this term and the photosynthetic process are well known and understood in the art.

In further support of the Applicant's position that the claims of the invention as written are enabling, the Examiner's attention is brought to the Department of Energy's website which lists 4025 scholarly publications on biomass (See Exhibit III which is a printout of the first three pages from the *U.S. Department of Energy website,* http://www.eere.energy.gov/biomass/progs/searchdb.cgi, accessed October 17, 2007). As an example, one article from the list, "The U.S. Department of Energy Biofuels Research Program" teaches the process of using "biomass encompass[ing] agricultural and forestry residues, woody and herbaceous energy crops, municipal solid waste, and underutilized traditional forests" as a fuel source (The abstract from the Dept. of Energy Website is attached as Exhibit IV.)

The Department of Energy website also states, "since there are an abundance of biomass related Web sites, we have organized them into the following categories to facilitate your search." These categories include federal, congressional, state, academic, trade organizations, international organizations, and so forth specifically dedicated to the use of biomass. Thus, "photosynthetically produced" biomass is well defined term of the art and is clearly supported by the prior art.

The photosynthetic process is also well known and well documented. It is generally known in the art that plants (as well as some phytoplankton, algae, and bacteria) carry out the photosynthetic process. Energy is absorbed from sunlight by green-colored chlorophyll, a porphyrinoid-type natural dye. This dye absorbs the

light impinging on the foliage and thereby causes a reaction which uses the energy of the sunlight absorbed by chlorophyll. This reaction provides the energy which is the basis of all higher life forms on the planet and is taught in substantially all primary and secondary schools.

Thus, in accordance with MPEP Guidelines, the phrase "biomass materials that are photosynthetically produced" need not be recited and preferably should not be recited in the specification. This is because the term should be absolutely clear from the teachings of the prior art and requires no experimentation or undue burden to practice the invention.

Further, referring again to enablement standard as set out in MPEP 2164.01, "even a background section" can provide enablement. In fact, the background of the present invention refers to a plethora of previously issued U.S. patents and other documents providing descriptions of biomass materials that are photosynthetically produced. For example, U.S. Patent 4,318,710 to Pilipski states in col. 1, line 64-67, "it is an object of this invention to provide a process for converting wood stock and any biomass having a significant cellulose content into charcoal." The application contains a description of transforming "plant coal" and "wood stock" into diesel fuel. Applicants would also like to specifically draw the Examiner's attention to U.S. Patent 5,707,762 to Johnssen which discloses conversion of solar energy into electrical energy by way of biomass.

Further support for the enablement of "photosynthetically produced biomass" can be found based on the standard set out in MPEP 2173.02 relating to the clarity and precision of the claim language. The relevant portion of the MPEP states:

> "Some latitude in the manner of expression and the aptness of terms should be permitted even though the claim language is not as precise as the examiner might desire. The essential inquiry pertaining to this requirement is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. Definiteness of claim language must be analyzed, not in a vacuum, but in light of:
> (A) The content of the particular application disclosure;
> (B) The teachings of the prior art; and
> (C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made. (Emphasis Added)

Thus, Applicant respectfully considers that the standard is one of reasonableness and not exactness. The claim language must be examined in light of not only the specification but also the teachings of the prior art and one having an ordinary level of skill in the art. As has been clearly demonstrated above, one having an ordinary level of skill in the art is well aware of biomass, photosynthesis, and which biomass is photosynthetically produced.

Thus, the present application is clearly enabling for all biomass that is photosynthetically produced. In view of the above, withdrawal of the rejection for enablement is respectfully requested.

II. REJECTION OF CLAIMS UNDER 35 U.S.C. § 112, SECOND PARAGRAPH AS BEING INCOMPLETE FOR OMITTING ESSENTIAL ELEMENTS

In the Office Action, the Examiner argues that the claims are rejected under 35 U.S.C. 112, second paragraph because elements of the invention have been omitted from the disclosure. These omitted elements are alleged to be the nexus between the creation of the biomass coal and the storage of solar energy because it is not clear how the atmospheric carbon dioxide level is reduced by storing the biomass coal and how this process stores solar energy. Applicant respectfully disagrees with this position of the Examiner.

Referring again to MPEP 2173.02, the standard for interpreting the precision and clarity of the claim language is governed by the following:

> The essential inquiry pertaining to this requirement is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. Definiteness of claim language must be analyzed, not in a vacuum, but in light of:
> (A) The content of the particular application disclosure;
> (B) The teachings of the prior art; and
> (C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

The standard for a rejection under 35 U.S.C. § 112 is not based on exactness of the disclosure, but rather on a reasonable degree of clarity. Taking each of the elements discussed in MPEP 2173.02, the nexus between the creation of biomass coal and the storage of solar energy will now be shown. In addition, it will be shown how the atmospheric carbon dioxide level is reduced by the storing of the

biomass coal in light of (A) the content of the particular application disclosure, (B) the teachings of the prior art, and (C) the claim interpretation given by one given by one possessing the ordinary level of skill in the pertinent art.

In view of the above and specifically, the teachings of the prior art, the formation of biomass as a result of the photosynthetic process is a chemical reaction. Generally, in any chemical reaction, substances enter the reaction and different substances are formed in the reaction. It is generally known that a certain amount of energy is either used to enable such reaction (i.e. an endothermic reaction) or produced as a result of such reaction (i.e. an exothermic reaction).

The formation of biomass as a result of the photosynthetic process is called an "assimilation" wherein a plant reacts with atmospheric CO_2 to form carbohydrates which are used in the organism of the plant to produce the various compounds which are required by the plant for its growth. As noted above and describe in more detail in section I, biomass and the photosynthetic process are well known in the art.

Regarding specifically the nexus between the creation of biomass coal and the storage of solar energy, elementary carbon is stable even in air and is easily oxidized in a reaction with oxygen to form CO_2. This oxidation generates a relatively high heat of combustion in the order of 32.8 kJ/g and thus is classified as

an exothermic reaction. In the reverse, converting CO_2 into a carbon compound of a lower state of oxidation as compared to CO_2 requires a certain amount of energy which is dependent on the state of oxidation of carbon in the reaction product. Such a reaction thus would be classified as an endothermic reaction. These two reactions are known as oxidation and reduction reactions, respectively.

Thus, the formation of carbon compounds from atmospheric CO_2 constitutes a reduction of CO_2 and is endothermic in nature. This requires a supply of energy. The nexus between the creation of biomass coal and the storage of solar energy is such that when a plant uses solar energy to reduce atmospheric CO_2, the CO_2 is removed from the atmosphere and stored as biomass.

In photosynthesis, water molecules are split whereby hydrogen atoms and hydroxyl radicals are produced. The hydrogen atoms reduce CO_2 to carbonaceous compounds which form carbohydrates, some of which react further to produce carbohydrate polymers including starch and cellulose. Cellulose is the primary carbohydrate which gives plants their rigid and stable structures. The hydroxyl radicals react further to form oxygen which is emitted by the plant.

As a consequence of the above reactions in biomass which carry out the photosynthetic process (such as plants), CO_2 is removed from the surrounding air and at the same time, the absorbed sunlight energy is used to form carbon

compounds such as wood. As a result of the above-described assimilation reaction, the atmospheric CO_2 levels are reduced.

In the absence of oxygen, a pyrolysis reaction (as is well known in the art and described in the Background of the Invention of the present application) is used to form elemental carbon and the elemental carbon is stored under conditions in which the carbon is prohibited from reacting with oxygen (which would result in re-formation of the amount of CO_2 removed from the atmosphere).

Storage of these carbon compounds, including as wood and charcoal, represents the storage of solar energy. (The formation of coal is also well known in the art. The process is thousands of years old. For example, the Babylonian Scriptures, states, "In the place of R. Eliezer, wood was cut on the Sabbath wherewith to produce charcoal on which to forge the iron." Tractate Yevomos, page14a, accessibleat http://www.come-and-hear.com/yebamoth/yebamoth_14.html) Solar energy was provided in the endothermic reactions that produced these carbon compounds. Thus, the carbon compounds contain an increased amount of energy over the atmospheric CO_2 as a result of the energy input from the sunlight. Converting the created carbon compounds to elemental carbon now requires less energy than the energy which would be required by reducing CO_2 to elemental carbon.

Thus, in short, storing the elemental carbon obtained from such carbon compounds, in fact includes the storing of solar energy inputted into the reactions. The plants used this energy to produce the carbon compounds from which the biomass coal is obtained and after converting the biomass into biomass coal, this energy is durable and retrievably stored.

Still further, the present application describes the process of creating biomass coal and the storage of solar energy as well as the reduction of atmospheric carbon dioxide at least in paragraphs [0025] and [0026]. The paragraphs, quoted here for convenience of the Examiner, state:

> [0025] A predetermined amount of the annularly produced wood or charcoal may be used as an energy source by combustion; also, or alternatively, a predetermined amount of charcoal may be retrieved from the bunkering plant by conventional conveying means and may be used as an energy source by combustion. In any case, as long as the amount of CO_2 released thereby into the atmosphere does not exceed the amount of CO_2 which has been removed from the atmosphere by means of the prior charcoal storage, the atmospheric CO_2 level will remain below the level which existed prior to the charcoal storage.
>
> [0026] The rate of CO_2 removal from the atmosphere and the atmospheric CO_2 level are thus determined by the amount of biomass and biomass coal produced and stored within a given time period in relation to the rate of CO_2 release into the atmosphere. The rate of CO_2 removal from the atmosphere and the atmospheric CO_2 level may also be agreed upon by an international convention such as the Kyoto Convention. In any event, the atmospheric CO_2 level can be maintained below the level, which will generate the undesired greenhouse effect, either by reducing the biomass or biomass coal utilization for generating energy by combustion or, in the alternative, by increasing the amount of biomass, which is harvested and converted into biomass coal, or by increasing the storage period of the thus produced biomass coal. (emphasis added)

Paragraphs [0025] and [0026] disclose that to practice present invention, the level of CO_2 in the atmosphere is reduced by removing CO_2 from the atmosphere and storing the CO_2 as biomass coal.

Thus, it is clear from the disclosure of the present application that one having ordinary skill in the art would be able to practice the invention as claimed. Referring now more specifically to the individual steps of claim 1 which have been referenced indirectly in the Office Action, biomass is produced photosynthetically, harvested, and converted into biomass coal. The photosynthetic process removes CO_2 from the atmosphere and requires sunlight energy. Claim 1 teaches the limitation of "storing said biomass coal in order to thereby reduce the atmospheric CO_2 level by an amount of CO_2 which is equivalent to the amount of carbon present in the stored biomass coal." Thus, it should be clear to one having ordinary skill in the art what the nexus is between the creation of biomass coal and the storage of solar energy.

Thus, in accordance with MPEP 2173.02, based on the teachings of the prior art, the disclosure of the present invention, and the understanding of one having ordinary skill in the art, the nexus between how the atmospheric CO_2 level is reduced by storing the biomass coal and how this is storing solar energy is clear. Claim 1 is therefore allowable. The dependent claims are also allowable for similar reasons and their dependency on allowable claim 1.

III. REJECTION UNDER 35 U.S.C. § 112, SECOND PARAGRAPH FOR FAILING TO PARTICULARLY POINT OUT AND DISTINCTLY CLAIM THE SUBJECT MATTER WHICH APPLICANT REGARDS AS THE INVENTION.

The Office Action has rejected claims 1-36 under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim what the time frame is for the regrowing process. The Office Action further states that "it would seem the regrown biomass would have to reach a certain level of maturity before it amounted to the amount of harvested biomass."

The standard for determining failure to particular point out and distinctly claim the invention under 35 U.S.C. § 112 is again found in MPEP 2173.02, stating:

> In reviewing a claim for compliance with 35 U.S.C. 112, second paragraph, the examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. 112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent. See, e.g., Solomon v. Kimberly-Clark Corp., 216 F.3d 1372, 1379, 55 USPQ2d 1279, 1283 (Fed. Cir. 2000). See also In re Larsen, No. 01-1092 (Fed. Cir. May 9, 2001). (emphasis added)

One having ordinary skill in the art would be aware of when he or she was infringing the claims of the present application. Referring to independent claim 1, claim 1 teaches a claim limitation of, "producing photosynthetically an amount of biomass . . . harvesting said amount . .. regrowing, between two successive

harvesting operations, an amount of biomass which corresponds to said harvested amount of photosynthetically produced biomass . . .".

The time frame for the regrowing process is variable and in fact, a person having ordinary skill in the art would infringe the above-quoted limitations of claim 1 so long as x amount of biomass was grown, harvested, and regrown, irrespective of maturity of the biomass.

The claim language particularly points out and distinctly claims the subject matter because each of the steps of claim 1 can be practiced by an infringer. For example, a person having ordinary skill in the art may practice this invention by using 1 kg of photosynthetically produced biomass or 1 million kg of photosynthetically produced biomass. The 1 kg or 1 million kg of biomass is then harvested and regrown. As stated in the claim language, the amount that is harvested is the amount that is regrown. Thus, if 1 kg is harvested, 1 kg is regrown. If 1 million kg is harvested, 1 million kg is regrown. The amount that is harvested, in these examples, either 1 kg or 1 million kg, is then converted into biomass coal.

The Office Action's concern with maturity is not relevant to the invention as claimed in independent claim 1. For example, one having ordinary skill in the art would be practicing steps of claim 1 if he or she chose to harvest an immature crop

and then regrow the crop to this amount of immaturity and converted the harvested immature crop into biomass coal.

Typically, however, a person having ordinary skill in the art who is practicing the invention as claimed would harvest, for example, an agricultural plant at the natural harvesting time. Harvesting time varies by species and breed of plant, location of planting, weather conditions, and so forth. Thus, in an application of the invention as claimed, a practitioner of the invention might harvest his pumpkin crop at the end of October of each year and his strawberry crop in August. Both crops are forms of photosynthetically produced biomass. If the practitioner of the invention then regrows the harvested amount of biomass, such as at the next harvesting cycle (which is likely but not always a subsequent October and August, respectively, in the present examples) one is infringing upon these limitations of claim 1.

With regards to dependant claim 35, the claim teaches the limitation of "harvesting said wood from said given forested area entails harvesting said wood from a sustainable forested area", a person having ordinary skill in the art of forestry would understand and appreciate the parameters affecting the growth and regrowth of trees. Thus, in accordance with the above arguments with reference to claim 1, when the biomasses of trees which have been harvested have regrown to the pre-harvested level, the respective claim limitation has been practiced. Again, the type

of tree, local weather, and other conditions would affect the time until the biomass is regrown and the subsequent harvesting operation takes place.

All other claims are allowable for similar reasons and based upon their dependency of allowable claim 1. Thus, withdrawal of the rejection of allowance of all pending claims is respectfully requested.

IV. CONCLUSION

It has been demonstrated hereinabove that claims 1-36 which are currently of record in the application satisfy the requirements of 35 U.S.C. 112, first paragraph and 35 U.S.C 112, second paragraph. Thus, the Examiner's rejection of the claims based on these grounds should be withdrawn and application passed to issue.

Applicants have made the best faith effort to place the present application in condition for allowance. However, if any issue raised by the Examiner remains unanswered, she is invited to call the undersigned at the telephone indicated herein below. Early examination of this application is respectfully requested in view of the above Amendment and Remarks.

Applicants respectfully petition for two months extension of time for replying. The respective Petition and credit card payment accompany this Response.

Respectfully submitted,

SILBER & FRIDMAN

By:_____
Lawrence G. Fridman,
Attorney for Applicant
Registration No. 31,615

1037 Rt. 46 East, Suite 207
Clifton, New Jersey 07013
Tel. (973)779-2580
Fax (973)779-4473